Liability and Risk Management in Civil Aviation

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To do justice to a subject as diverse and sophisticated as risk management in the time allotted me is a challenge particularly as we are looking from both an airline as well as an airport perspective. However, in both cases the risk managers priority is to protect the balance sheet of his company against accidental but largely identifiable risks.

For a definition of Risk Management I quote that of the UK C11.

Some regard risk management as a science, some an art; the reality is a mixture of both but whichever school of thought you favour the end result is measured in money saved or lost.

The catastrophe potential within the airline industry is well understood and two examples particularly in 1996 demonstrated this only too tragically. One was the fire at Dusseldorf Airport; the other the mid air collision near Delhi.

Although disasters of this kind are rare these recent examples are a powerful reminder of what can occur if things go wrong for whatever reason.

However, there are many other less obvious risks that occur with much greater frequency that may have a significant impact on the operational effectiveness and ultimately revenue generating capacity of an organisation.

In order to appreciate what these risks are it is an imperative for any organisation to identify the full range of risks inherent in their particular operations. The range of exposures will vary from operation to operation although there will be many

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Editor's Note: The communication presented by Mr. Michael Woods was accomplished with the projection of slides. Therefore, there will be references to slides wich are not reproduced in the present text.

common features. It may be useful to identify some of the key generic headings which can be summarized as follows:

These are umbrella headings under which can be identified a range of specific risk exposures for use as a checklist in risk assessment.

There is of course a correlation betweeen frequency and impact of risk, which is traditionally shown in risk management as a pyramid for use in developing a risk profile and which is reproduced in this slide.

In electing to include the topic of risk management in this conference the organisers believed it would provide an opportunity to address the question of how to lower the cost level of airport and airline businesses.

In looking at cost I think we should be looking at the true or total cost of risks more correctly referred to as 'Defined Cost of Risk' a more practical reference as it is difficult to assess the 'Total Cost' and how these might be better managed or reduced, rather than focusing solely, as many are tempted to do, on the cost of insurance protection.

What is the true cost of risk? An insurance industry survey identified the following breakdown in the cost of risk:

Cost	% of Total
Transfer mechanisms (including insurance premiums)	15
Retention costs (including self insurance and deductibles)	85
Control costs (including preventative equipment)	
Administration	

The cost of safety can be defined as:

- Safety Equipment
  +
- General Safety Measures
  +
- Staff Training including Specialists
  +

- Costs associated with the administration of the Safety Department
  +
- The cost of direct losses
  +
- Indirect costs
  +
- Insurance premiums

As the world's business environment has become increasingly competitive the challenge throughout the 1990's has been to maximize cost reduction in previously neglected areas and thereby to contribute positively to profit improvement.

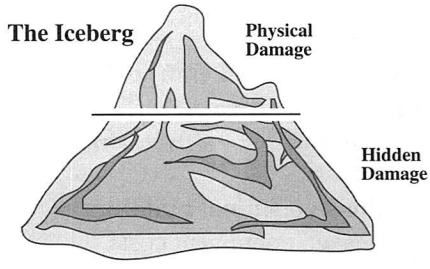
Many losses are 'unnecessary' and avoidable, and because they are unexpected do not represent part of the operational cost structure and must be considered as directly reducing profits.

Based on the general assumption - that uninsured losses directly impact bottom line profits, the advantage in minimizing these losses is great.

Let us take this assumption and develop an admittedly over simplified example. If a business has a profit ratio of 5%, then the necessary additional turnover needed to earn an additional US$1 of profit is US$20. An unnecessary loss of US$1 also requires the organisation to generate increased sales of US$20 to return the company to the same profit level.

The impact on profitability can, therefore be quite dramatic. The cost justification for Risk Management can also be clearly appreciated, and the Risk Management Department can suddenly be regarded as a profit centre in its own right, rather than merely a cost centre.

Our research has shown that the indirect costs following a minor loss can often exceed the direct cost by a factor of five or more. We describe this as the 'iceberg' theory where more is hidden than is seen.



These examples give a very clear indication of the additional costs associated with a range of relatively small attritional losses. Industry wide it is estimated that incident costs of this kind cost in excess of US$2 billion each year. Figures of this magnitude are hard to comprehend, hard to identify and therefore easy to challenge; but one European operator who carried out a detailed exercise to quantify the additional costs involved calculated an amount equivalent to the lost revenue of flying a Boeing 747 empty across the Atlantic everyday for a year! If the amount involved worldwide were equated with profit its perhaps not too far fetched to imagine the world's entire fleet of jet aircraft winging its way across the Atlantic in formation, all empty, an exaggeration perhaps but a powerful image to persuade an operator to spend the time on a detailed risk analysis exercise. As we are addressing civil aviation as a whole, which includes Airports and Airlines, I thought it would be an interesting exercise to follow a passenger from arrival at his point of departure on a Boeing 747 flight through to his airport of final destination.

1. **Arrives at airport and parks in airport car park.**
   Car damaged by blown debris.
   Possibly responsible: airport authority, contractor, airline.

2. **Checks in and enters embarkation area.**
   Fire in terminal.
   Death or injuries; damage to property; delay to passengers and aircraft; business interruption to aircraft and airport operators, concessionaries, etc.

3. **Lands a mile short of the Runway.**
   Loss of aircraft, passenger fatalities, baggage/cargo third party damage on the ground plus loss of revenue, disrupted schedules, reputation, morale, other contingent exposures.
   Possibly responsible: manufacturer, pilot, maintenance, ATC.

4. **Bursts tyre on Landing.**
   Damage to aircraft, injury to passengers, costs of deploying emergency services. Delay to other flights, increased costs. Loss of revenue to airline/airport, delay and inconvenience to passengers, disrupted schedules, etc.
   Possibly responsible: pilot, airport authority, manufacturer.

5. **Strikes service vehicle.**
   Damage to vehicle and aircraft, delay, inconvenience to passengers, rescheduling, loss of revenue, etc.
   Possibly responsible: pilot, driver, airport authority.

6. **Passenger slips in terminal building.**
   Injury to passenger, contingent costs.
   Possibly responsible: passenger, airport authority, concessionaire.

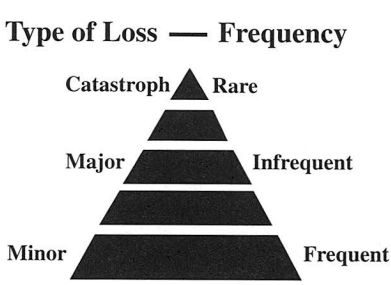
The scenarios I have just outlined identified some of the key risk exposures faced by an airline or an airport operator. As can be seen from the potential results of these incidents a clearly defined risk management strategy needs to be developed to tackle these issues if the assets of the organisations are to be protected effectively.

Arranging insurance cover is the conventional method of obtaining cost effective protection. However, insurance is only part of a wider risk management approach that involves:

- Risk identification
- Risk assessment and evaluation
- The elimination or reduction of risks
- Control of risks
- Transferring risk, including under contract examples by service providers, finance, etc, but most commonly by insurance

If we now focus on the risks faced by an Airport Authority it is clear that running an airport exposes an owner or operator to potentially catastrophic financial liabilities. If a loss or injury to a third party is caused by a negligent act of the operator or their employees/agents then inevitably a claim will be brought against them.

The exact exposure to liability will vary from specific airport to airport and a thorough review of exposures is necessary to develop a clear understanding of the airport's risk profile, which brings us back to the risk management pyramid.



Specific examples of incidents that have resulted or could have resulted in significant liabilities for airports include:

Incident	Type of Loss	Amount US$
· Collision of two aircraft *	Catastrophe	207,000,000
· Bomb aboard aircraft **	Catastrophe	500,000,000
· Engine ingestion of ice	Major	1,000,000
· Passenger slipping on terminal concourse	Minor	10,000
· Damage to 20 cars in car park by blown debris	Minor	20,000

* *Tenerife, March 1977; involving KLM and Pan Am*
** *Pan Am Lockerbie, December 1988*

There are a wide variety of services that airports provide that may give rise to such losses. These exposures can be summarized under the following headings:

Non-Airside

In this area the liability of an airport authority is similar to that of the owner of any large building open to the public, although the variety of services provided at an airport and the sheer volume and concentration of people, present particular problems.

In addition to the public liability associated with the ownership and/or operation of the terminal buildings, liability can arise from such services as:

- Car parking facilities
- Restaurants, cafeterias
- Passenger and baggage handling
- Security screening
- Etc, etc.

These exposures can often be categorized as high frequency/low value incidents, although, in the case of a major fire or building collapse, the loss can be substantial.

A recent tragic example was the fire at Dusseldorf Airport, the cause of which was the result of contractors undertaking minor repairs within the terminal building. A spark from welding equipment caused a fire resulting in dense toxic smoke which spread through the building. There were 17 deaths and 6 serious injuries.

Airside

Operations in this area present the greatest potential for major claims because of the high value of a modern commercial aircraft, the large number of passengers and the volume of cargo they can carry. Risk areas include:

Apron Services

The ground handling of a modern airliner involves many specialized vehicles and operators. Careful control is necessary since repair costs and consequential loss expenses resulting from an associated delay can result in large claim amounts.

Refueling

Whilst the actual refueling of aircraft is usually carried out by specialist companies, an airport authority may be responsible for the provision of tank farms and hydrant systems used by the concessionaire, thereby incurring liability.

Maintenance and Safety

Liability of an airport authority can arise from a failure in their responsibility to maintain runways, taxiways and aircraft parking areas essential to the safe operation of aircraft. Navigation and landing aids, satisfactory fire fighting and emergency services are also the responsibility of the airport authority.

Security

Airside security is increasingly an area of significant exposure. Terrorism is a universal problem even if an airport is not a direct target remains and of critical concern, but there is also the hazard arising from terrorist access to airside areas that would allow the terrorist[s] to 'plant' explosive devices on aircraft.

In this latter scenario, the explosive device may either detonate whilst the aircraft is in flight or after landing at another major airport, but the airport authority may retain liability for this security lapse.

Air Traffic Control

This presents the most obvious potential for catastrophe exposure in the operations of an airport. The worst foreseeable example would be a mid-air collision with the associated ground third party damage.

Additionally the risk of damage or breakdown to essential ATC computer and telecommunications equipment could lead to serious consequences.

Airside ATC continue to have responsibility until the aircraft is safely docked. This involves both liability for own staff and equipment (e.g., motor vehicles) and to third parties.

Many ATC operators own and operate aircraft for equipment calibration and testing purposes. An aviation Hull policy must be arranged to cover damage to the aircraft; while the liabilities can normally be covered under the main aviation liability policy.

Sub Contractors

In practice many of the above operations are often performed by sub-contractors to the airport. Although there is no 'direct' exposure ultimately the airport itself is liable for all liabilities arising out of all the operations at the airport and they should ensure that sub-contractors have adequate insurance and that the airport authority/company is named as an additional assured under these policies with a Cross Liability Clause.

Airport World recently published the results of the November 1995 ACI Apron Safety Incident Accident Survey which are reproduced in Appendix 2 to this paper.

A summary of the information shows that of 425 incidents for the month incidents/accidents involving aircraft accounted for 35.70% (29.10% caused by handling equipment; 6.60% caused to or by moving aircraft). The balance of 64.30% arose from accidents/accidents involving equipment and facilities (2.30% jet blast; 46.00% equipment to equipment damage; 16.60% equipment to facility damage).

The survey also shows the trend for the past five years is improving although there is no room for complacency and the aim must be for zero incidents.

Although we are witnessing the development of a range of financial instruments as alternative risk transfer mechanisms, insurance remains the most common and popular means of transferring risk.

One of the three most frequent questions asked relates to the adequacy of limits of liability (the other two concern price and scope of cover).

The main factors to be borne in mind when deciding on the size and adequacy of the limits to be carried are the type of aircraft using the airport, the volume of traffic and the number of passengers.

Where an airport is used by wide bodied aircraft the airport authority faces the possibility of being held responsible for the destruction or damage of, for example, one or more Boeing 747 aircraft.

The nature of airport operations is such that there is an inevitable accumulation of aircraft and passengers at the operational phases where statistically the greatest possibility of loss is likely, i.e., take-off and landing, (take off climb 32.60%; descent landing 60.90%; balance 6.50% loading, taxiing/unloading cruise).

Whilst the value of the actual potential hull could be up to US$175m the full loss could be considerably greater when liability claims are considered, for passengers and any other third parties. To this figure must be added the potential accumulation of loss where more than one aircraft is involved in an accident either on the ground or in the air (within the airport's controlled air space).

It is therefore important that the limit of liability be sufficient to meet such possibilities. International airline operators, for example, carry limits of up to US$1,500,000,000 any one accident (and in some cases, more) and major airports carry insurance coverage for similar limits.

It must be remembered however, that until now an aircraft operator may under most circumstances rely on their conditions of carriage to limit their liability, whilst no such protection exists for an airport authority. This of course will change when the IATA ICA comes into effect providing unspecified limits for airlines.

Liability limits also have to reflect future trends such as:

- the increase in aircraft and property values
- higher capacity aircraft
- increasingly congested airports and air corridors
- increasing levels of passenger and other third party awards
- the future of the Intercarrier Agreement proposed by IATA is still in doubt, however, whatever the outcome there is no doubt that limits of liability will be increased or eliminated one way or another.

- The outcome will inevitably put further pressure on the level of awards worldwide.

In response to these influences there is no doubt in my mind that the liability limits carried by airlines will in the near future be closer on average to US$2 billion than US$1 billion as at present.

A good risk management strategy will help to eliminate and reduce some losses, by identifying the risks to which an organisation is exposed so that they can be controlled, retained and where appropriate transferred.

For the catastrophe risk insurance remains the most cost effective transfer mechanism so it may therefore be of interest to take a brief look at the aviation insurance market.

This market is quite small in world terms and very interrelated, with many underwriters writing airlines, airports and manufacturers; with some writing general aviation as well.

As a result of the limited market and the catastrophe nature of many of the risks written the market can be quite volatile.

As an indication of historic insurance market profitability this slide shows the airline and products picture between 1987 and 1996.

Finally let me conclude with what is possibly the most disastrous and traumatic event that can happen to an airline or an airport operator large or small.

That is a major aircraft accident involving multiple fatalities; not only for the loss of life, injuries and grief to the affected families and friends but also the paralysing effect an accident can have on the company and its employees.

It is essential that every organisation involved in the air transportation business, especially an airline, be thoroughly prepared for such an eventuality. It is a false belief that this type of catastrophic event can only happen to others.

When a major aircraft accident occurs three things will happen immediately:

- Extreme media attention on the organisations involved, i.e., the airline, the aircraft manufacturer, the airport and immediately related participants.
- The operator will be besieged for information and action, to initiate and conduct an immediate investigation into the circumstances and to notify the states of the operator, registry and manufacture
- The Government will launch an investigation into the facts, conditions and circumstances surrounding the accident.

The three basic situations require immediate action. With a clear understanding of the process involved before such an event occurs, a plan of action will enable the airline to respond to such a situation more effectively.

Every airline and airport therefore must have a Business Continuity Plan incorporating emergency response procedures that is flexible enough to adapt to all eventualities. A plan that is regularly reviewed and updated, and most importantly, periodically practiced to ensure that in the unlikely event of a catastrophe the response is clear, decisive and effective.

In my opening remarks I referred to Risk Management as both an art and a science which it is; but it also has to be part of the management culture of a company with top down commitment and a state of mind for every employee.

We are after all talking out potential corporate survival issues.

Appendix

RISK MANAGEMENT : CASE STUDY ONE
Incident:
During taxiing ready for departure a B767 aircraft, with 290 passengers and 10 crew, struck a set of passenger steps that had been left on the edge of the apron.
The incident took place in an overseas location.

Resultant Action:
- All passengers and crew were provided with overnight accommodation;
- 2 engineers were flown to location to undertake temporary repairs;
- Replacement parts were leased;
- As a result of the incident the airline had to delay 4 subsequent flights that day;
- As these delays exceeded 4 hours 2,250 passengers were given complementary hot meals;
- A replacement aircraft was sent to ferry passenger back;
- Additional chartered flights were undertaken by leased aircraft (leased for these flights only);
- The damaged aircraft was ferried back to base, empty;
- In total the aircraft was out of service for 6 days;

Costs:
- Direct physical costs.....L 5,000
- Estimated additional costs incurred as a result of incident.....50,000

RISK MANAGEMENT : CASE STUDY TWO

Incident:

During push back a B767 skidded on icy apron, impacting with the tug.
The apron area had not been de-iced, although the aircraft had.
The flight was an internal, non revenue flight, with no passengers aboard.

Resultant Actions:

- 4 engineers were sent to complete temporary repairs;
- The aircraft was placed in a third party's hangar while temporary repairs were undertaken;
- These repairs took 270 man hours;
- The aircraft was then returned to home base;
- Because of the nature of damage the aircraft was then flown to a third party facility for further repairs;
- Additional fuel, ground handling and landing charges were levied;
- The aircraft was out of service for 3 weeks;
- Return ferry flights were incurred;
- 250 man hours were spent by the airline in handling the consequential administrative work caused by the loss;

Costs:

Direct physical costs.....L 170,000
Estimated additional costs incurred as a result of incident.....105,000
Additionally the airline were unable to lease spare aircraft to third parties during this period, resulting in further potential loss of income.

RISK MANAGEMENT : CASE STUDY THREE

Incident:

A B707 freighter was damaged by cargo containers during a wind storm.

Resultant Actions:

- Temporary repairs were made at location;
- The aircraft was flown to third party repair site;
- These repairs took 5 weeks;

Costs:

- Direct physical costs.....US$320,000
- Potential loss of income.....500,000
  (based on 10 flights during period aircraft was grounded)

RISK MANAGEMENT : ADDITIONAL CASE STUDIES

- A B757 was waiting to be marshalled onto the gate. An air conditioning unit had been left by the previous ground crew and the Marshaller assumed that it was in a safe location. The air hose was sucked into the left engine.
  A spare engine cowl was installed while the damaged unit was repaired. The cost of replacement of the hose was US$1,400.
  In total the aircraft was out of service for 2 days while an engine change was completed.
  The cost of the loss was US$500,000.

- A beltloader ran under the fuselage of a B737-200.
  US$24,000 worth of physical damage was done and the aircraft was out of service for 144 hours.

- A catering truck, parked next to the right service door, caught fire while servicing a B737-300.
  Damage to the aircraft included replacement door lining and miscellaneous parts.
  The cost was US$130,000 and the aircraft was out of service for 18 days involving 1,728 man hours to complete repairs.

- Due to congestion around the apron area, a cargo agent drove a tug with 3 cargo trailers between No 3 and 4 engineers of a B747 parked at the gate. The agent struck the side of engine No 4 causing damage to the cowling and fan blades.
  The cost was US$305,000 and the aircraft was out of service for 19 hours.

- Maintenance had been performed on a B747 parked at the gate. A full passenger load was aboard and the cabin doors secured. It was discovered that maintenance had left a scarce set of tools aboard and on opening the door the escape chute was inadvertently deployed. No spare slide was available and therefore passengers were de-planed. Another aircraft was diverted to pick up the stranded passengers.
  The direct cost was US$4,700

- An aircraft taxied out of the gate and applied power. A baggage trolley was blown onto a B737-400 engine exhaust.
  This incident cost US$90,000 to repair.

- A B747 was at the gate ready for departure when a mobile lounge drove under the aft fuselage, causing substantial damage. A second aircraft made an unscheduled detour to collect stranded passengers from subsequent knock-on delays.
  The damaged aircraft had temporary repairs and then was returned to based, involving a 3 hour ferry flight.
  The aircraft was out of service for 11 days and cost US$196,930 to repair.

- A narrow bodied jet was struck by a catering truck, damaging an aerial.
  The direct, physical cost amounted to US$17,000.
  Indirect cost relating to this totalled US$230,000.

- A taxiing wide body jet struck another, causing direct costs of US$1,900,000. US$4,800,000 in indirect costs were incurred.

- A terminal pier struck an aircraft door.
  The cost of repair to the narrow bodied jet was US$50,000, but associated indirect costs exceeded US$600,000.

- A major European international airline estimated that indirect costs exceeded US$50,000,000 per annum.
  This figure was an estimate and was considered to be conservative.